

AMPHIPODS OF THE PHLIANTID GROUP IN THE SOUTH AUSTRALIAN MUSEUM, WITH A SUGGESTED DIVISION OF THE FAMILY

By KEITH SHEARD, HONORARY ASSISTANT IN ZOOLOGY, SOUTH AUSTRALIAN MUSEUM.

Fig. 1-6.

THE examination of five new species of the family Phliantidae provides an opportunity for a brief revision of the family, which falls into two divisions:

- a. Genera with first maxillae incomplete, telson entire.
- aa. Genera with first maxillae complete, telson cleft.

- 1899 *Phliadidae* Stebbing, Tr. Linn. Soc. Lond., ser. 2, Zool. vol. 7, p. 414.
- 1906 *Phliadidae* Chevreux, Bull. Soc. Zool. Fr., vol. 31, p. 87.
- 1906 *Phliantidae* Stebbing, Das Tierreich, 21, pp. 200, 726.
- 1909 *Phliantidae* Chilton, Tr. N. Zeal. Inst., vol. 41, p. 61.
- 1910 *Phliantidae* Kunkel, Tr. Coun. Ac. Sci., vol. 16, p. 19.
- 1910 *Phliasidae* Chevreux, Mem. Soc. Zool. Fr., vol. 23, p. 201.
- 1916 *Phliantidae* Barnard, Ann. Sth. Afr. Mus., vol. 15, pt. 3, p. 155.
- 1927 *Phliantidae* Reibisch, Handbuch der Zoologie, Kunkenthal, iii band, i halfte, p. 799.
- 1932 *Phliantidae* Pirlot, Siboga-Expeditie, M. xxxiib, Livr. cxvii, p. 105.

In order to accommodate the very diverse genera and yet give a framework strict enough for valid identification, the characteristics of the family have been extended, and two subfamilies have been erected, although the claims of *Bircenna*, *Eophliantis* (gen. nov.), and possibly *Kuria* Walker to inclusion in a separate family are strong.

FAMILY PHLIANTIDAE.

Peraeon strongly developed. Pleon segments 5-6 subject to degradation. Antennae 1-2 short, antenna 1 without accessory flagellum, flagellum with sensory filaments. Upper lip with distal margin usually undivided. Lower lips without inner lobes. Mandible without palp. Maxilla 1 variable. Maxillipeds with palp joints variable.

Gnathopods 1-2 simple or feebly chelate. Peduncle laterally produced in one or more pleopods. Uropod 3 usually not biramous. Telson entire or cleft.

With two subfamilies:

a. Telson cleft	..	..	..	..	..	..	..	<i>Eophliantinae</i>
aa. Telson entire	..	..	..	..	..	..	..	<i>Phliantinae</i>

a. EOPHLIANTINAE, Subfamily nov.

Peraeon strongly developed. Pleon segments 5-6 very small. Antennae 1-2 short and slender, antenna 1 without accessory flagellum. Upper lip not divided. Mandible without palp, molar variable. Maxilla 1 with inner plate and one jointed palp (? *Kuria*). Maxillipeds, inner plate reaching to outer; palp four-jointed. Gnathopods 1-2 simple or feebly chelate. Pleopods biramous, peduncles expanded. Uropods 1-2 biramous. Uropod 3 variable, very small. Telson cleft to base, upturned.

With three genera and five species:

a. Uropod 3 biramous	..	..	..	..	..	..	..	<i>Eophliantis</i>
aa. Uropod 3 not biramous.								
b. Side-plates shallow	..	..	..	..	..	..	..	<i>Bircenna</i>
bb. Side-plates deeper than segment	..	..	..	..	..	..	..	<i>Kuria</i>

EOPHLIANTIS gen. nov.

Peraeon strongly developed (sub-cylindrical). Head almost spherical. Eyes small. Side-plates shallow. Antennae 1-2 short and slender. Molar present on right mandible. Maxilla 1 with outer and inner plate and one jointed palp. Peraeopods 3-5 with second joint widely expanded. Peraeopod 5 the longest. Pleopod 1 peduncle slightly expanded; pleopods 2-3 with peduncles widely expanded; all biramous. Uropods 1-3 biramous, uropod 3 very small but with joints clearly marked. Telson small, cleft to base, upturned.

Genotype: *E. tindalei* sp. nov.

EOPHLIANTIS TINDALEI sp. nov.

♀ All segments to the third pleon segment very loosely articulated. Head with distinct neck. Antenna 1, ultimate joint of peduncle the longest; flagellum five-jointed with sparse setae. Antenna 2, shorter, division of peduncle and flagellum not marked; total seven-jointed. Right mandible with weak molar and feeble spine-row. Left, clear, with cutting edge produced. Maxilla 1, outer plate bearing six, toothed spines, inner with six (?); palp one-jointed with a single apical seta. Maxilla 2 with short base and long subequal plates, outer with eight, inner

with six slender spines. Maxilliped as in *B. fulva* Cbilton. Gnathopod 1 long and slender, with a secondary unguis and accessory spine on the seventh joint. Gnathopod 2 long and very slender, otherwise comparable. For pereopods, see fig. 2, 1-K.

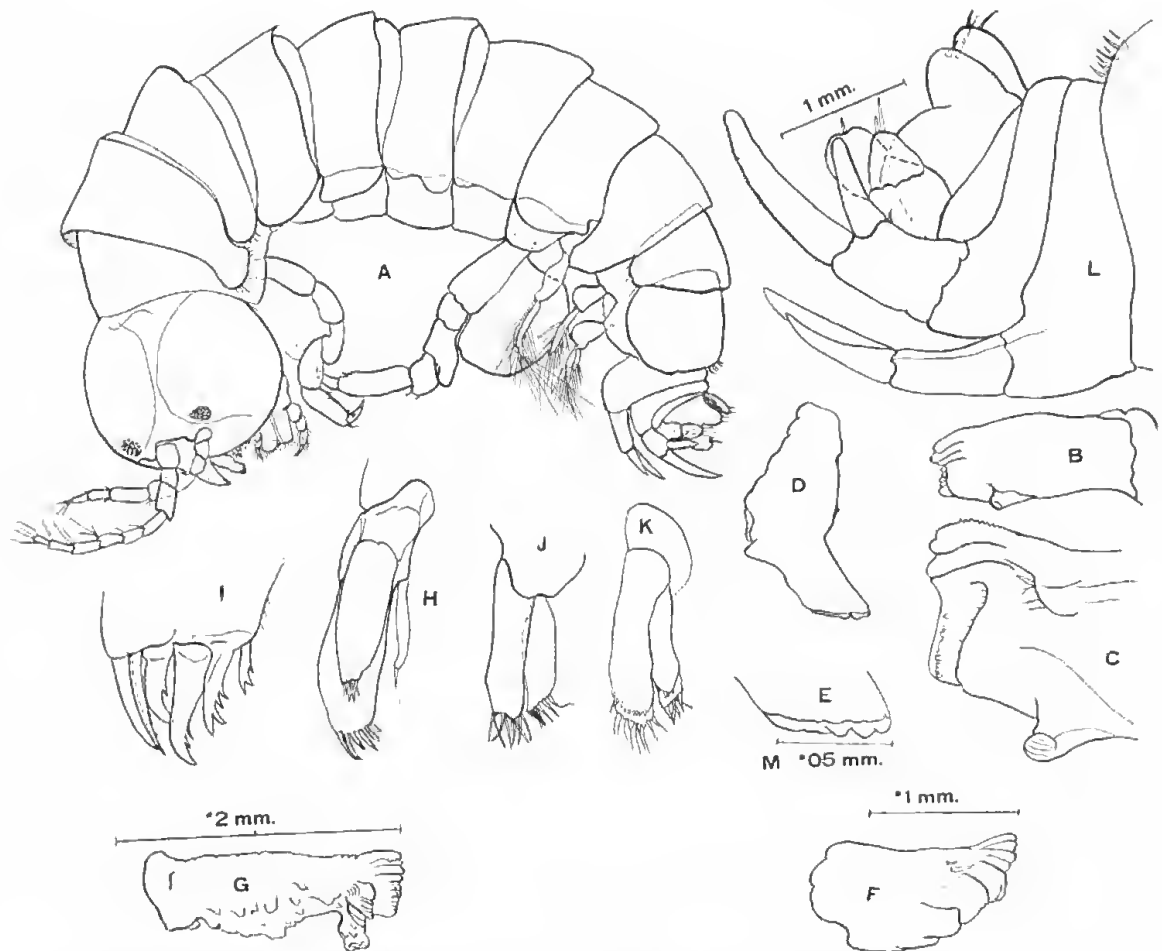


Fig. 1. A-L, *Eophliantis tindalei*, male; A, lateral view of type male; B-C, right mandible; D-E, left mandible; F, mandible, immature; G, mandible, paratype male; H, maxilla 1; I, spines of outer plate; J, maxilla 2; K, maxilla 2 of form with mandible G; L, uropods and telson; M, comparative scale for B, C, D, E, H.

Pleopods 2-3 with broadly expanded peduncle twice as wide as long, rami moderately setose.

Two sets of three spines each occur on the right and left postero-dorsal edges of the third pleon segment. Segments 4-6 small but distinct. Uropod 1, outer ramus equal to peduncle, inner one and one-third times longer; inferior margins of rami lined with fine spines. Inner ramus equal in length to inner ramus plus peduncle of second uropod. Uropod 2 three-quarters as long as uropod 1, with inner ramus equal to peduncle, outer one and one-half times inner, margins smooth. Uropod 3

slightly shorter than peduncle of uropod 2, rami rounded, equal to peduncle, outer ramus with one, inner with two apical spines.

Telson short, triangular, upturned, completely cleft into two triangular nearly opposed facies, each tipped with two spines.



Fig. 2. *Eophlantis tindalei*, female; A, antenna 1; B, antenna 2; C, D, gnathopods 1-2; E, gnathopod 2, seventh joint, paratype; F, gnathopod 2, seventh joint, type; G-L, peraeopods 1-5; M-N, pleopods 2-3; O, uropods and telson.

Colour, pale yellow.

Length, 4 mm.

Loc. Tasmania; Pt. Wynyard, in fine sand and algae, on tidal rocks, periodically flooded with river water. (N. B. Tindale, Apl. 1936). Types in South Australian Museum, Reg. No. C. 2072, 2073.

The type male from the same locality differs from the female in the following particulars:

Antenna 1, flagellum six-jointed. Antenna 2, total eight-jointed.

Gnathopods 1-2 with the infero-distal angle of the sixth joint slightly more produced. Infero-lateral edge of pereon segment 1 slightly more produced with three spines on each of the antero and postero-lateral angles. Infero-lateral edge of pereon segment 2 bears three spines centrally. Two sets of six moderately stout spines are present on the postero-dorsal edge of the third pleon segment.

Uropod 1 with inner ramus only slightly longer than peduncle of uropod 2. Uropod 2 longer than uropod 1, with inner ramus equal to peduncle, outer nearly twice inner, with inferior margin armoured with very short spines. Uropod 3 longer than peduncle of uropod 3. The sex differences are very slight. The individual variations in the mandibles and sixth joints of the gnathopods are of interest.

Females have been noted carrying from three to eleven developing ova in the brood-pouch. One male was peculiar in possessing an accessory row of small spines on the plates of the second maxillae (fig. 1, K). The difference in the manner of carrying the uropod segments in this subfamily as typified by *E. tindalei* compared with that of the subfamily *Phliantinae* is striking.

BUCENNA Chilton.

Body broad. Head not rostrate. Antennae short, subequal, both pairs very slender; second with prominent gland cone. Mandibles without palp, molar wanting or weak. Maxilla 1 with inner and outer plates and one jointed palp. Maxillipeds with outer plate not extending beyond inner, palp four-jointed, fourth joint small, not unguiform. First and second gnathopods with the hinder apex of the sixth joint a little produced. Pleopods all biramous, and with the peduncles broadly produced laterally. Uropods 1-2 with unequal, curved rami. Uropod 3 rudimentary. Telson cleft to base, each half triangular and more or less opposed.

With three species:

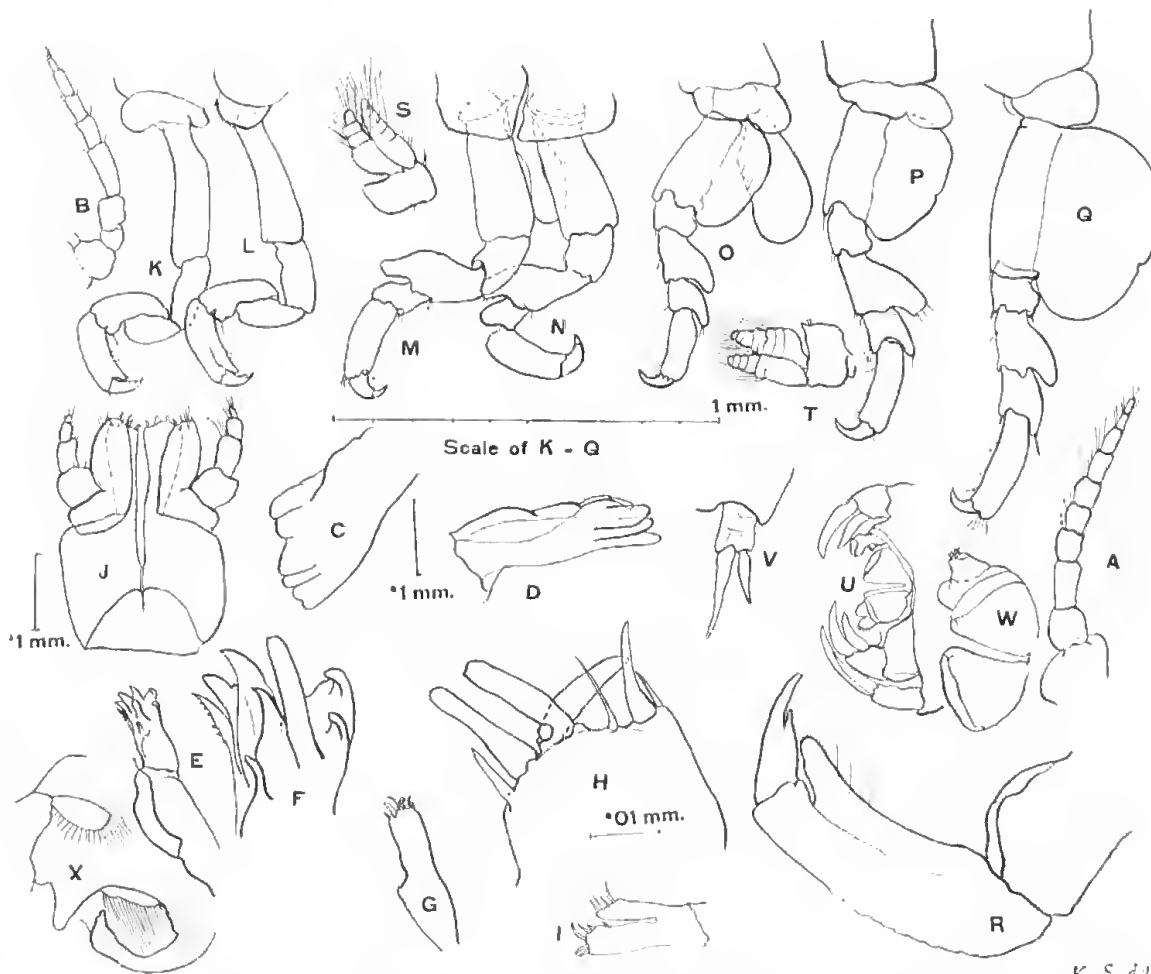
- a. Molar wanting.
 - b. Uropods 1-2 with rami nearly twice peduncle *fulva*
 - bb. Uropods 1-2 with rami nearly equal peduncle *crassipes*
- aa. Weak molar present both mandibles *nichollsi*

BUCENNA FULVA Chilton.

One of the syntypes was kindly lent for examination by the Director of the Canterbury Museum, and is here figured in detail. The three-membered first maxilla is to be noted (fig. 3, E, F, G). There are three spines on the postero-dorsal margins of the third pleon segment.

Bircenna nichollsi sp. nov.

♀ Peraeon much larger than pleon. Head not rostrate, but slightly bulging forwards over antennae. Eyes very small. Antennae very slender and short. Second with small calceolus on distal edge of fifth joint of peduncle. Plagellum



K. S. det.

Fig. 3. A-X, *Bircenna fulva*, female; A, antenna 1; B, antenna 2; C-D, mandibles; E, maxilla 1, outer plate and palp; F, tip of outer plate; G, inner plate; H, tip of inner plate; I, maxilla 2; J, maxillipeds; K-L, gnathopods 1-2; M-Q, peracopods 1-5; R, gnathopod 2, terminal joints, cotype; S-T, pleopods 2-3; U, uropods and telson; V, uropod 1; W, telson and uropod 3; X, setiferous lobes of lower lip.

two-jointed. Mandible with weak molar, cutting edge produced. Maxilla 1 with outer plate bearing six finely-toothed spines, inner with five simple spines, one jointed palp with one apical seta. Maxilla 2 with very short base and long, sub-equal, flattened plates. Maxillipeds very small, with third joint of short palp the longest, fourth joint more swollen than in *B. fulva*. Gnathopods 1-2 like *B. fulva*, but production of infero-distal edge of sixth joint not as acute, and with gnatho-

pod 1 slightly longer than gnathopod 2. Peraeopod 5 is slightly shorter than peraeopod 4. Pleopods 1-3 with peduncles more than twice as broad as long (*B. fulva* less than twice as broad as long).

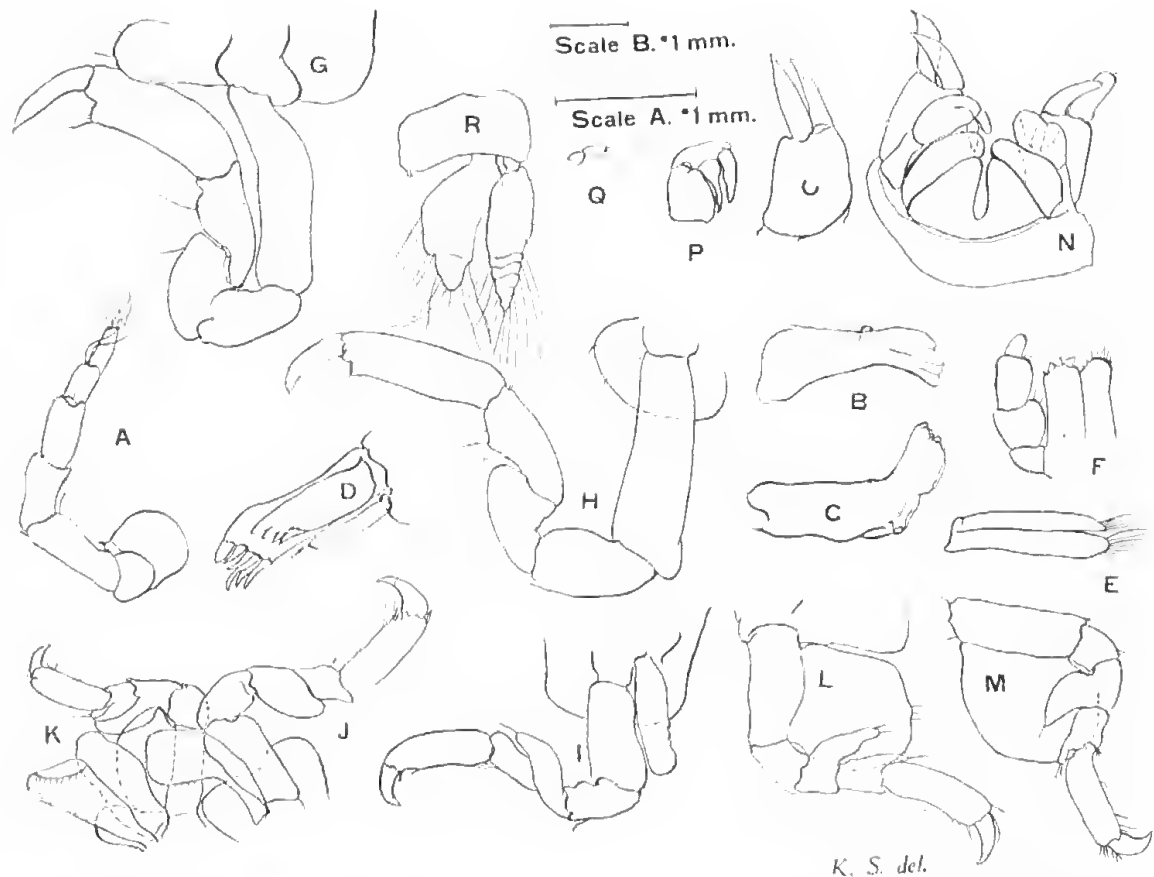


Fig. 4. A-R, *Birceana nichollsi*: A, antenna 2; B-C, mandibles; D, maxilla 1; E, maxilla 2; F, portion of maxilliped; G-H, gnathopods 1-2; I-M, peraeopods 1-5; N, uropods 1-2 and telson; O, uropod 1; P, uropod 2; Q, uropod 3; R, pleopod 3.

Uropod 1 with rami subequal, slightly shorter than peduncle, with a small hooked spine on each ramus near the apex. Uropod 2, rami subequal, inner slightly longer, equal to peduncle; the whole appears to form a hooked structure. Uropod 3 extremely small, apparently consisting of a peduncle and single ramus, tipped with two setae, hidden by the short triangular, cleft telson.

Size, 2 mm.

Loc. South Australia: St. Vincent's Gulf, Sellick's Beach, among algae growing on the film of sand covering rocks below low-tide mark (H. M. Hale, 1936). Type in South Australian Museum, Reg. No. C. 2074.

The ovigerous female with two developing eggs was the only specimen collected. It has been named in honour of Professor G. E. Nicholls, of the University of

Western Australia, who has worked on a number of Australian and Antarctic Amphipods.

In general it resembled *B. fulva* fairly closely, but is remarkable for the shortness and slenderness of the gnathopods and pereopods, the longest being only very slightly longer than the depth of the body: *B. fulva*, at least twice as long as the greatest body depth.

KUTRIA Walker.

1903 Nat. Hist. Sokotra and Abd-El-Kuri, Liverpool Mus. p. 228.

It is evident that this genus is closer to *Bircenna* than to the typical *Philantinae*, but it is desirable that the first maxillae be re-examined. In this revision it has been placed, tentatively, with the *Eophliantinae*.

It is difficult to accept Stebbing's positive identification of *Bimacolina algicola* Della Valle with *B. cuniculus* (*Ampilhoe cuniculus* Stebbing). It may be of advantage to re-examine the types of the first-named with special reference to the mouth parts and telson.

aa. PHILANTINAE Subfamily nov.

Peraeon strongly developed. Pleon segments 5-6 subject to degradation. Antennae 1-2 very short. Antenna 1 with joints of peduncle generally expanded, no accessory flagellum, flagellum with sensory filaments. Upper lip with distal margin usually undivided. Lower lip without inner lobes. Mandible without palp. Maxilla 1 incomplete; maxilliped with palp variable. Gnathopods 1-2 simple or weakly chelate. Peduncle laterally expanded in one or more pleopods. Pleopod 3, inner ramus subject to degradation. Uropod 3 usually not biramous. Telson short, entire, not upturned. With 8 genera, 10 species.

Synopsis of genera:

- a. Maxillipeds, palp two-jointed *Temnophlias*
- aa. Maxillipeds, palp more than two-jointed.
 - b. Maxillipeds, palp three-jointed.
 - c. Uropod 3 biramous *Phlias*
 - cc. Uropod 3 not biramous.
 - d. Uropod 3, peduncle and ramus distinct . . . *Percinnotus*
 - dd. Uropod 3, peduncle not distinct from ramus . . . *Paliannotus*
 - bb. Maxilliped, palp four-jointed.
 - e. Pleopod 3, inner ramus well developed . . . *Iphinotus*
 - ee. Pleopod 3, inner ramus rudimentary.
 - f. Uropod 3, peduncle distinct from ramus *Quasimodia* gen. nov.
 - ff. Uropod 3, peduncle not distinct from ramus.
 - h. Maxilla 1 with palp *Plioplaleia*
 - hh. Maxilla 1 without palp *Iphiplateia*

QUASIMODIA gen. nov.

Body depressed, pleon strongly flexed. Segments of body tuberculate in medio-dorsal line. Peraeon segment 1, medio-dorsal area produced, cowl-like, over the head. Mouth parts as for Iphiplateia. Gnathopods 1-2 simple. Pleopod 3, inner ramus vestigial and non-setose or rudimentary and setose. Uropods 1-2 biramous. Uropod 3 consisting of peduncle and ramus, inner ramus sometimes present in modified form. Telson short, entire.

With three species:

- | | | | | | |
|-----|--|----|----|----|-----------------------|
| a. | Pleopod 3, inner ramus vestigial, non-setose | .. | .. | .. | <i>Q. womersleyi</i> |
| aa. | Pleopod 3, inner ramus rudimentary, setose. | | | | |
| b. | Uropod 3, ramus twice as long as peduncle | .. | .. | .. | <i>Q. capricornis</i> |
| bb. | Uropod 3, ramus equal to peduncle | .. | .. | .. | <i>Q. barnardi</i> |

Ovigerous females of the species described were associated with specimens of the same size, but lacking marsupial plates, and with a slightly greater development of sensory setae. These I assume to be males. Although the generic and specific characteristics keyed are of small and relatively inaccessible parts, they can be readily distinguished by the application of the following method (after Womersley and Hale):

1. Clear in synthetic oil of wintergreen, 1-2 hours.
2. Pass through acetic acid.
3. Mount in gum chloral.

Should a more detailed examination be necessary a specimen may be stained whole in Magenta Red and dissected in xylol-balsam. The procedure is as follows:

The specimen is passed to absolute alcohol; several drops of Magenta Red in absolute alcohol acidified with acetic acid are added and left for 2-5 minutes. Excess of stain is washed out with alcohol. Xylol (free of water) is then dropped into the last watch-glass of alcohol until no further milkiness is obtained. The specimen is then dried and transferred from this glass to pure Xylol for 5-10 minutes, and then dissected in 50-50 xylol-balsam. The stained mounts obtained tend to fade a little in course of time, but this disadvantage is slight in consideration of the sharp and clear detail which can be obtained under the highest powers. The method has an added advantage with crustacean chitin in that specimens are not rendered brittle or tough. It has been used for Isopoda, Cnidaacea, and Amphipoda with equal success.

QUASIMODIA WOMERSLEYI sp. nov.

Body depressed, dorsal ridge tuberculate, each segment forming a rounded prominence, first segment with a pseudo-rostrum on the mid-dorsal line, projecting

cowl-like over the head. The last peraeon, and first pleon segments are projecting backwards in prominent tubercles. Remainder of pleon small and carried well under the body. All segments developed.

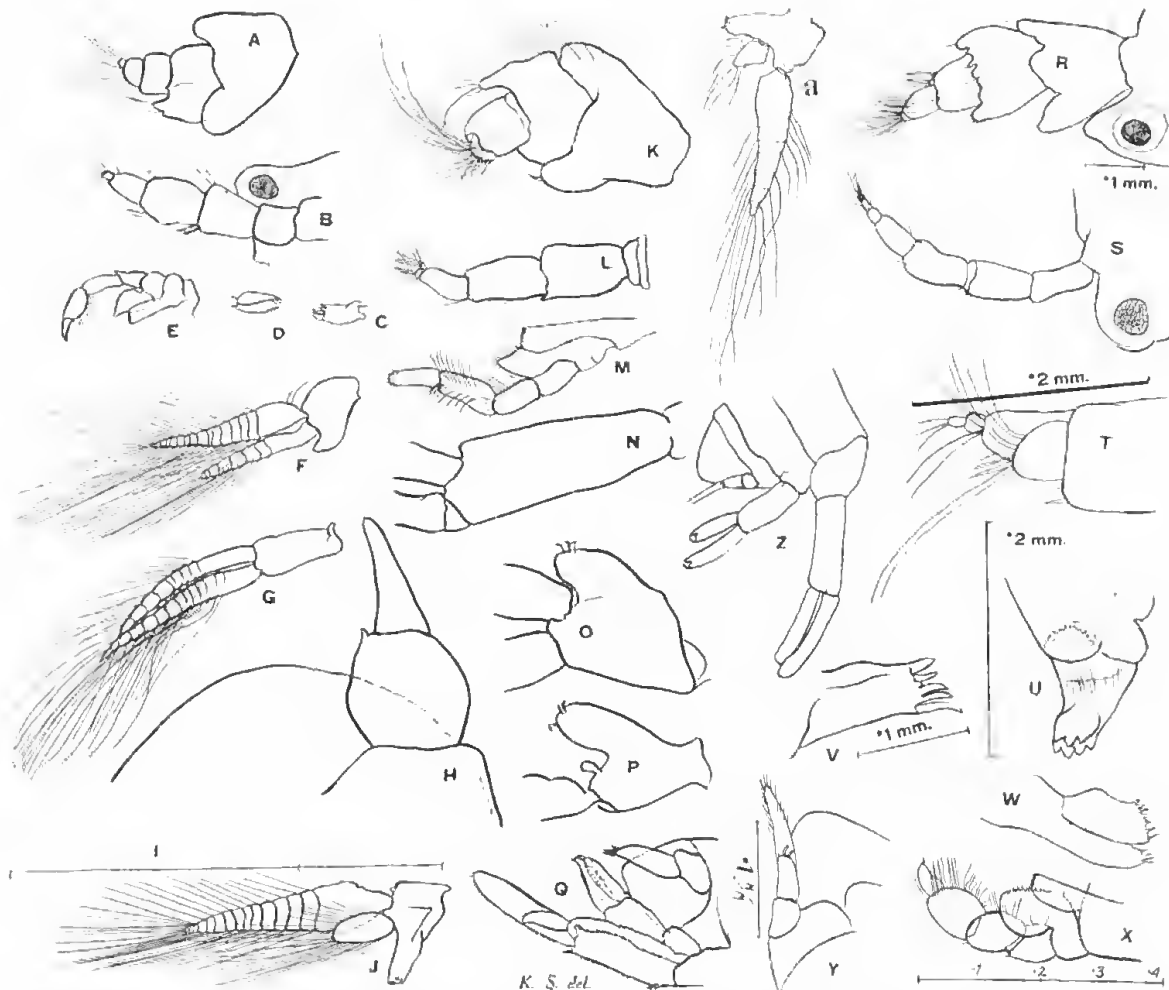


Fig. 5. A-a, *Quasimodia*, gen. nov. A-J, *Q. barnardi*; A, antenna 1; B, antenna 2; C, maxilla 1; D, maxilla 2; E, maxilliped; F, pleopod 2; G, pleopod 1; H, uropod 3 and telson; I, scale of length of pleopod 1; J, pleopod 3 at scale 1. K-Q, *Q. womersleyi*; K, antenna 1; L, antenna 2; M, maxilliped; N-P, peduncles of pleopods 1-3 with P showing inner ramus; Q, uropods 1-3 and telson. R-a, *Q. capricornis*; R, antenna 1; S, antenna 2; T, accessory flagellum of antenna 1; U, mandible; V, maxilla 1; W, maxilla 2; X, maxilliped; Y, telson and uropod 3; Z, uropods 1-3 and telson; a, pleopod 3.

Side-plates as in *Iphiplatcia*. Branchiae leaf-like and uniform. Side-plates 5-7 lightly bilobed, very small. Eyes moderately prominent, oval and slightly raised. Antenna 1, first joint the largest, dorsal and ventral edges strongly produced forwards, ventral projection setose, dorsal terminating in a spine. Third joint small; flagellum one-jointed, button-like, very strongly setose. Antenna 2 like *Iphiplatcia*, but with a single-jointed setose flagellum.

Mouth parts as for *Iphiplateia*, but mandible with flattened rounded process representing molar tubercle, maxillipeds, palp with joints long and slender; fourth long, tipped with short hairs; inner plate more rounded than in *I. whiteleggei*, outer with forward angles acute.

For gnathopods and peracopods see comparative figure (fig. 6, E-K).

Peracopod 5 with fourth joint only moderately expanded, this appendage the longest.

Pleopod 1 with peduncle three times as long as broad, nearly cylindrical, inner ramus slightly the shorter. Pleopods 2-3 as in *Iphiplateia*.

Uropod 1, peduncle spined on inner margins, as long as outer ramus, twice as long as hooked inner ramus. Uropod 2, as long as peduncle of first and nearly as stout; subequal rami nearly as long as peduncle. Uropod 3 projecting beyond telson, peduncle short and rounded; single ramus, a slender cone tipped with three spines. Twice as long as peduncle. Telson subtriangular, entire, smooth.

Size, 4 mm.

Loc. South Australia: Yorke Peninsula, Inneston. Reef, below low tide (H. Womersley, Entomologist to the South Australian Museum), after whom the species is named; Apl. 1936). Type in South Australian Museum, Reg. No. C. 2078.

QUASIMODIA CAPRICORNIS sp. nov.

Body like *Q. womersleyi*, but tubercles not so pronounced. First segment only slightly produced forwards. Backward production of first pleon segment not so pronounced, pleon only moderately depressed. All segments distinct, but sixth very small. Side-plates with angles squarer than for *Q. womersleyi*. Eyes moderately prominent. Antenna 1: first and second joints expanded, third about half as long as first, flagellum two-jointed with an accessory setose scale arising from the infero-distal edge of the third joint of the peduncle. Antenna 2: flagellum three-jointed. Mandible: cutting edge quadri-dentate, secondary cutting edge tridentate, spine-row with weak, hair-like spines; molar, a rounded prominence. Maxilla 1: a single plate only with six spines. Maxilla 2: bilobed. Maxilliped with inner plate small, outer reaching half-way up second joint of palp, which is short and stout.

Peracopods normal for genus (see fig. 6 L-R).

Pleopods 1-2 normal. Pleopod 3 with inner ramus very small, but bearing 7-8 setae.

Uropod 1: rami subequal, outer equal to peduncle, not hooked. Inner margin of inner ramus indented. Uropod 2: rami subequal, slightly hooked, outer ramus equal

to peduncle. Uropod 3: outer ramus more than three times peduncle; inner small, slightly longer than peduncle, very difficult to separate from outer, with two small hooks.

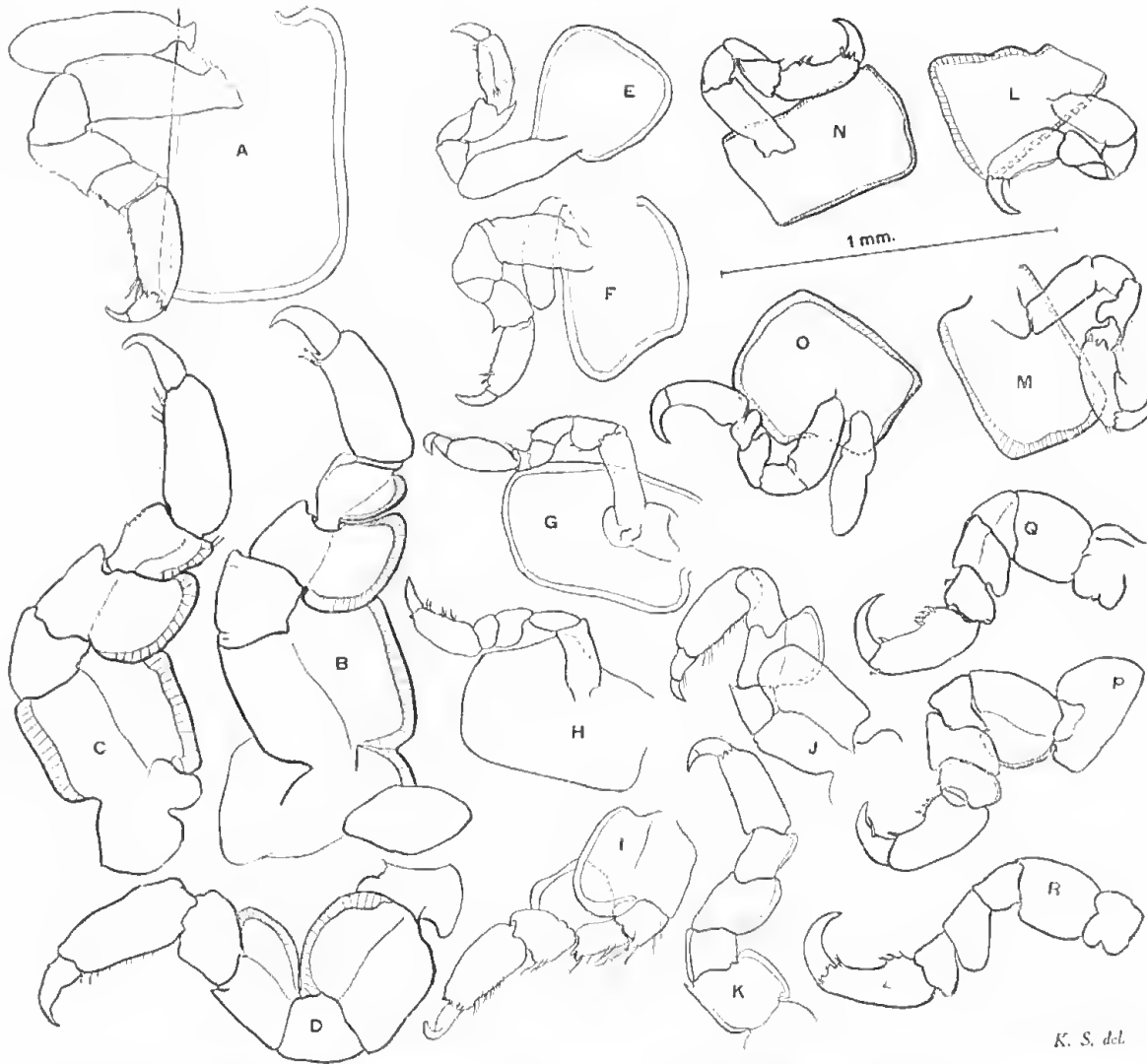


Fig. 6. *Quasimadia*, gen. nov. A-D, *Q. barnardi*; A, pereopod 1; B-D, pereopods 3-5. E-K, *Q. womersteysi*; E-F, gnathopods 1-2; G-K, pereopods 1-5. L-R, *Q. capricornis*; L-M, gnathopods 1-2; N-R, pereopods 1-5.

Telson triangular, entire.

Size, 4 mm.

Loc. South Australia: St. Vincent Gulf, Sellick's Reef, on rocks covered with algae and sand; 1 fath. (H. M. Hale, Apl. 1936). Types in South Australian Museum, Reg. No. C. 2075-2076.

QUASIMODIA BARNARDI SP. NOV.

Body typical of genus, but appearing more massive owing to the greater development of joints 2-4 of peraeopods 3-5. First peraeon segment like *Q. womersleyi*. Antenna 1 short, second joint of peduncle expanded only on inner edge; flagellum two-jointed, second joint very small. Antenna 2 slender; flagellum with one joint. Mandibles and maxillae very small, but with the characters of the genus. Maxilliped with short plates and long slender palp, third joint as long as second, but rounded on inner side with long setae; fourth joint slightly hooked.

Peraeopods (see fig. 6, A-D). Peraeopods 1-2 like *Q. womersleyi* except that the fifth joint of peraeopod 1 is collar-shaped. Peraeopods 3-5 relatively massive, with the postero-distal margins of joints 2-4 strongly expanded.

Pleopod 1 with peduncle not expanded, biramous, longer than pleopod 2, and more than one and one-half times as long as pleopod 3. Pleopod 2 with peduncle prolonged, inner ramus the shorter. Pleopod 3 small with peduncle produced to a long process; inner ramus ovate, not segmented, as long as peduncle, bearing many setae.

Uropods 1-2 like *K. womersleyi* but not spined. Uropod 3 consisting of peduncle and ramus, peduncle projecting beyond telson, sub-spherical, as wide as long, ramus finger-like and equal to peduncle.

Telson entire, rounded, twice as broad as long.

Size 3 mm. Type female.

Loc. South Australia: Yorke Peninsula, Inneson (H. Womersley, Apl. 1936). Type in South Australian Museum, Reg. No. C. 2079.

Males and females bearing ova were collected in company with *Q. womersleyi* at Inneson, Yorke Peninsula.